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EXAMINER	
MILLER, PATRICK L	

ART UNIT	PAPER NUMBER
2837	

DATE MAILED: 02/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/629,402	TANNER, BRIAN K.	
	Examiner	Art Unit	
	Patrick Miller	2837	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 November 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,7-16,18-21 and 23-35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *32-34* is/are allowed.

6)☒ Claim(s) *1-4,7-16,18-21,23,24,31 and 35* is/are rejected.

7)☒ Claim(s) *25-30* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Applicant's arguments filed on November 15, 2004 have been fully considered but they are not persuasive.

   - With respect to Claims 1, 12, and 19, Schirle (6,055,120) does disclose determining spin-up parameters of the spindle motor based on a temperature of the voice coil motor (VCM), where the spin-up parameters include the spin-up voltage. Specifically, the detected temperature "sets" a time-out period; the processor determines the spin-up parameter, speed, based on the set time-out period, and the speed parameter is determined by the voltage across the motor (voltage parameter) during spin-up to "normal" speed (Fig. 2, #28; Fig. 3, #71; col. 4, ll. 35-65).
   - Additionally, based on a further examination of the Schirle and Wallis references, the Examiner has withdrawn the indication of allowability for Claims 8, 21, 24, and 35.

Specification

2. The disclosure is objected to because of the following informalities: see bullet(s) below. Appropriate correction is required.

   - Page 17, line 12 of the specification recites, "the spindle coil 8 resistance..." According to Figure 2, item 8 is not this feature. Please clarify.

Claim Objections

3. Claim 21 is objected to because of the following informalities: see bullet(s) below. Appropriate correction is required.

   - Claim 21 recites, "the a signal" (l. 8). Delete "the."

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 7, 19, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schirle (6,055,120).

- With respect to Claims 1 and 19, Schirle discloses a disk drive with a voice coil motor (VCM) (Fig. 2, #27), and a spindle motor (Fig. 2, #21), the disk drive comprising: a processor configured to determine spin-up parameters of the spindle motor based on a temperature of the VCM (Fig. 2, #28; Fig. 3, #71; col. 4, ll. 35-65; detected temperature "sets" a time-out period; the processor determines the spin-up parameter, speed, based on the set time-out period, and the speed parameter is determined by the voltage across the motor (voltage parameter) during spin-up to "normal" speed), wherein the spin-up parameter is spin-up voltage (cols. 4/5, ll. 66-67/1-13; voltage parameter indicative of spindle speed). Additionally, the temperature sensor of Schirle (Fig. 2, #50) detects the ambient temperature inside the disk drive module (col. 4, lines 35-46). Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention that, since the voice coil motor emits heat, the ambient temperature sensed by the temperature sensor is comprised, in part, from the temperature of the VCM.
- With respect to claims 7 and 23, Schirle discloses the step of setting a time out period after which the spindle motor is turned off if it has not reached a desired operational

velocity (col. 4/5, lines 66-67/1-13), wherein the time out period is increased with a decrease in the temperature (col. 4, lines 31-34; increased time-out period when the temperature is low).

5. Claims 2-4, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schirle (6,055,120) as applied to claims 1 and 19 above, and further in view of Wallis (5,268,804).

- With respect to claims 2-4 and 20, Schirle does not disclose a means for determining the temperature of the VCM comprising a processor coupled to a coil winding of the VCM (claims 2 and 20), and determining the temperature comprises measuring the resistance of the coil, and a measurement circuit/device, that measures said resistance and provides the determined temperature to the processor (claims 3 and 4).
- With respect to claims 2-4 and 20, Wallis discloses a means for determining the temperature of a VCM based on the resistance of a coil of the VCM (col. 4, lines 47-63; Fig. 1, 'VCM Temperature' is sent to #4, which is in a processor. Additionally, the processor is coupled to the spindle motor and coupled to the coil via the temperature measurement means). Furthermore, the resistance is measured by a measurement circuit/device, and the determined temperature of the VCM, which is derived from the resistance of a coil of the VCM, is sent to the processor (Fig. 1, 'VCM Temperature' is sent to #4, which is in a processor. Additionally, the processor is coupled to the coil via the temperature measurement device/circuit/means). Wallis measures the temperature of the VCM as described to increase the time taken to move the data head between given positions if the temperature of the VCM is above a predetermined value (abstract). This

provides the advantage of reducing the heat built up in the mechanism moving the data without reducing the data access time (cols. ½, lines 63-68/1-5).

- Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention that a measurement circuit used to measure the resistance of a coil of the VCM to determine the temperature of the VCM could replace the temperature sensor of Schirle, thereby increasing the time taken to move the data head (of Schirle) between given positions, and providing the advantage of reducing the built-up heat in the mechanism moving the data without reducing the data access time, as taught by Wallis.

6. Claims 8-11, 24, 31, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schirle (6,055,120) in view of Wallis (5,268,804).

- With respect to Claims 8, 24, and 35, Schirle disclose a disk drive system comprising: a rotatable disk (Fig. 2, #11); an actuator that supports a transducer (Fig. 2, #14); a voice coil motor (VCM) including a coil winding configured to receive a signal to move the actuator so that the transducer is moved relative to the disk (Fig. 2, #27); a spindle motor having a plurality of windings and a rotor rotatable at an operating spin-rate during an operation mode of the disk drive (Fig. 2, #21); a spindle motor driver connected to apply winding currents across a combination of the spindle motor windings, and to receive a speed signal to enable measurement of spindle motor speed (Fig. 2, #28; cols. 4/5, ll. 66-67/1-13); a processor coupled to the VCM to apply a signal to measure the temperature of the VCM and provide a temperature estimate (Fig. 2, #28 coupled to #27; #28 receives measurement of VCM temperature from #50, where #50 measures the ambient temperature, which includes the temperature from the VCM); the processor further

coupled to receive the speed signal enabling measurement of the spindle motor speed, and the processor providing a signal to the spindle motor driver to turn off the spindle motor if the spindle motor speed has not reached the operating spin-rate after a period of time (col. 5, ll. 1-13); and the period of time is increased with a decrease in the temperature (col. 4, ll. 47-50).

- With respect to Claims 8, 24, and 35, Schirle does not disclose measuring the resistance of the VCM coil to determine the temperature of the VCM.
- Wallis discloses a means for determining the temperature of a VCM, wherein the said means comprises a processor and the means measures the resistance of a coil of the VCM (col. 4, lines 47-63; Fig. 1, 'VCM Temperature' is sent to #4, which is in a processor. Additionally, the processor is coupled to the spindle motor and coupled to the coil via the temperature measurement means). Furthermore, the resistance is measured by a measurement circuit/device, and the determined temperature of the VCM, which is derived from the resistance of a coil of the VCM, is sent to the processor (Fig. 1, 'VCM Temperature' is sent to #4, which is in a processor. Additionally, the processor is coupled to the coil via the temperature measurement device/circuit/means). Wallis measures the temperature of the VCM as described to increase the time taken to move the data head between given positions if the temperature of the VCM is above a predetermined value (abstract). This provides the advantage of reducing the heat built up in the mechanism moving the data without reducing the data access time (cols. ½, lines 63-68/1-5).

- Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention that a measurement circuit used to measure the resistance of a coil of the VCM to determine the temperature of the VCM could replace the temperature sensor of Schirle, thereby increasing the time taken to move the data head (of Schirle) between given positions, and providing the advantage of reducing the built-up heat in the mechanism moving the data without reducing the data access time, as taught by Wallis.
- With respect to Claim 9, Schirle discloses increasing a time for the spin-up of the spindle motor to reach an operating spin-rate with a decrease in the temperature estimate (col. 4, lines 31-34; increased time-out period when the temperature is low).
- With respect to Claim 10, Schirle discloses turning off the spindle motor if the spindle motor speed has not reached an operating spin-rate after a period of time, and the period of time is increased with a decrease in the temperature estimate (col. 5, ll. 1-13; col. 4, ll. 47-50).
- With respect to Claim 11, Schirle discloses controlling the spin-up time and the spin-up voltage (col. 4, ll. 35-65; detected temperature "sets" a time-out period (spin-up time); the processor determines the spin-up parameter, speed, based on the set time-out period, and the speed parameter is determined by the voltage across the motor (voltage parameter) during spin-up to "normal" speed). Also note that the controller controls the current and voltage to the spindle motor when it drives the spindle motor toward a "normal" speed and also when it shuts down the drive motor (controls current and voltage by turning off power to the motor) (col. 5, ll. 1-13).

- With respect to Claim 31, Schirle disclose a memory connected with the processor, wherein the memory contains code that causes the processor initiate the temperature determination (col. 3, ll. 45-52; microprocessor's circuitry allows operation, which includes determining temperature). Wallis discloses measuring the resistance of the VCM coil, and determining the temperature of the coil based on a calculation using the measured resistance (col. 4, ll. 47-63).

7. Claims 12-16, 18, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schirle (6,055,120) in view of Wallis (5,268,804).

- With respect to Claims 12 and 21, Schirle discloses an improvement in a disk drive for a voice coil motor (VCM) (Fig. 2, #27) and a spindle motor (Fig. 2, #21) comprising: a means for determining spin-up parameters for the spindle motor based on the temperature of the VCM, where the spin-up parameters comprise at least the spin-up voltage (Fig. 2, #28; Fig. 3, #71; col. 4, ll. 35-65; detected temperature "sets" a time-out period; the processor determines the spin-up parameter, speed, based on the set time-out period, and the speed parameter is determined by the voltage across the motor (voltage parameter) during spin-up to "normal" speed); and a spindle motor controller receiving a signal from the measurement circuit and controlling spin-up parameters of the spindle motor based on the measurement circuit signal (Fig. 2, #28).
- With respect to Claims 12 and 21, Schirle does not disclose a means for determining a temperature of the VCM, wherein said means comprises a measurement circuit coupled to a coil winding of the VCM to measure the resistance of the coil to determine

temperature. Also note the Examiner has looked to the specification to determine the Applicant's means and its equivalents under 112 (6^{th}) paragraph.

- Wallis discloses a means for determining a temperature of the VCM based on the resistance of a coil of the VCM (col. 4, lines 47-63; Fig. 1, 'VCM Temperature' is sent to #4, which is in a processor). Wallis measures the temperature of the VCM as described to increase the time taken to move the data head between given positions if the temperature of the VCM is above a predetermined value (abstract). This provides the advantage of reducing the heat built up in the mechanism moving the data without reducing the data access time (cols. ½, lines 63-68/1-5).
- Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to replace the temperature detector of Schirle with a means for determining a temperature of the VCM by measuring the resistance of a coil of the VCM, thereby increasing the time taken to move the data head (of Schirle) between given positions, and providing the advantage of reducing the built-up heat in the mechanism moving the data without reducing the data access time, as taught by Wallis.
- With respect to Claims 13 and 14, Wallis discloses the means for determining temperature comprises a processor, which is also a temperature measuring circuit, coupled to a coil winding of the VCM to measure resistance of the coil (col. 4, ll. 47-63).
- With respect to Claim 15, Schirle discloses the means for determining spin-up parameters comprises a spindle motor controller (Fig. 2, #28).
- With respect to Claim 16, Schirle discloses the means for determining spin-up parameters comprises a processor which provides control code to a spindle motor controller (col. 4,

ll. 50-59; internally the controller comprises a processor and a spindle motor controller; the controller 28 has a processor that uses the information in the lookup table to control the output to the spindle driver).

- With respect to Claim 18, Schirle discloses a means for turning off the spindle motor if the spindle motor speed has not reached an operating spin-rate after a period of time, and wherein the period of time is increased with a decrease in the temperature of the VCM (col. 4/5, ll. 66-67/1-13; col. 4, ll. 47-50).

Allowable Subject Matter

8. Claims 32-34 are allowed.
   - With respect to Claim 32, the Prior Art discloses causing the current applied to a spindle motor to increase torque during startup; however, the Prior Art does not disclose increasing the torque at startup to correspond to the decrease in the temperature estimate.
   - With respect to Claim 34, the Prior Art does not disclose providing a series of commutation clock pulses to advance the spindle motor driver between commutation states, and wherein the spindle motor controller controls timing of the commutation clock pulses to increase the torque applied during startup corresponding to a decrease in the temperature estimate.
9. Claims 25-30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

- With respect to Claim 25, the Prior Art discloses causing the current applied to a spindle motor to increase torque during startup; however, the Prior Art does not disclose increasing the torque at startup to correspond to the decrease in the temperature estimate.
- With respect to Claim 26, the Prior Art does not disclose a controller that provides a series of commutation clock pulses to advance a spindle motor driver between commutation states, and wherein the controller controls commutation clock pulses to increase the torque applied to the spindle motor during startup corresponding to the decrease in the temperature estimate provided by the processor.
- With respect to Claim 28, the Prior Art does not disclose the signal applied to measure the resistance of the VCM coil winding being a set voltage, and where the resistance is determined from the resulting current across the VCM coil winding.
- With respect to Claim 29, the Prior Art does not disclose the signal applied to measure the resistance of the VCM coil winding being a set current, and where the resistance is determined from the resulting voltage across the VCM coil winding.
- With respect to Claim 30, the Prior Art discloses a memory connected to a processor, wherein readable code is stored in the memory, and said code causes the processor to measure the resistance of a VCM during startup. The Prior Art also discloses determining a resistance value from a measured temperature and other motor measured motor parameters, determining a resistance value from temperature and other motor parameters stored in a lookup table, and determining VCM coil temperature from motor parameters stored in a lookup table. However, the Prior Art does not disclose

determining the temperature of a VCM coil from a lookup table that stores temperature corresponding to measured resistance.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patrick Miller whose telephone number is 571-272-2070. The examiner can normally be reached on M-F, 8:30-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Martin can be reached on 571-272-2800 ext 41. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9318.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-306-3431.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Patrick Miller
Examiner
Art Unit 2837

pm
February 3, 2005

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